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The second flora characterizes the middle and upper Devonian, and is called by ARBER *Archaeopteris* flora, because this fern predominates.

Other very interesting early types occurred in the upper Devonian, like *Archaeosigillaria*, *Protolepidodendron*, and numerous other earlier representatives of *Sphenophyllum*, *Sphenopteris*, and *Pseudbornia*.

This fascinating and very instructive little volume, whose value is increased by an extensive bibliography on the subject, forms a suitable monument for ARBER, who has been removed from the world of science at too early an age.—A. C. NOÉ.

### North American slime-moulds

In 1899 MACBRIDE'S *The North American slime-moulds* was published, which was the first comprehensive presentation of this interesting group for American botanists. A brief review of that work was published in this journal.[5] A second edition has just appeared,[6] the first edition "having been exhausted long ago." It corrects certain errata of the first edition, but chiefly it incorporates the results of research during recent years. The painstaking work and clear statement which characterize MACBRIDE have resulted in a book of unusual quality. It is intended especially for American students, and therefore discusses chiefly American species, but it also includes brief descriptions of other forms, and refers to many extra-limital species now generally recognized. To many botanists it will probably give a new perspective of a group of organisms often dismissed with too little attention.—J. M. C.

## MINOR NOTICES

**Manual of woody plants.**—TRELEASE[7] has published a second, revised edition of his small pocket manual of the woody plants used for decorative purposes. The intention of the author "is to make it possible for any careful observer to learn the generic and usually the specific name of any hardy tree, shrub, or woody climber that he is likely to find cultivated in the United States." The need of a new issue indicates that the manual has found a constituency. In the revised edition certain errors have been corrected, and the scope of the book has been enlarged by including a few additional types.—J. M. C.

**British forestry.**—A handy little volume by HANSON[8] gives in a non-technical manner the general principles of forestry as practiced in the British Isles and adjacent parts of Europe. In addition to plain directions for nursery and forest management, sawing and planting, felling and measurement, there are chapters on forest animals, birds, insects, weeds, and fungi. The final chapter deals with the uses of British timber. The book is in an easily readable style and seems to give a good idea of forestry as practiced in Great Britain.—GEO. D. FULLER.

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[5] BOT. GAZ. **29**:74. 1900.

[6] MACBRIDE, THOMAS H., The North American slime-moulds. A descriptive list of all species of Myxomycetes hitherto reported from the continent of North America, with notes on some extra-limital species. 8vo. pp. xvii+299. *pls. 23*. 1922.

[7] TRELEASE, WILLIAM, Plant materials of decorative gardening: The woody plants. 2d ed. 16mo. pp. xliii+177. Urbana: Published by the author. 1921. $1.00.

[8] HANSON, C. O., Forestry for woodmen. 12mo. pp. 238. *pls. 13. figs. 15*. 2d ed. Oxford. 1921.

## NOTES FOR STUDENTS

**Vegetation and climate.**—The most recent phase of ecology, which finds expression in attempts to introduce quantitative methods for the investigation of vegetation and of the factors that determine its nature and distribution, has received a notable contribution in a recent volume by LIVINGSTON and SHREVE.[9] "The existence, limits, and movements of plant communities are controlled by physical conditions" is stated as a fundamental law of plant geography, and an attempt is made to map the distribution both of various physical factors and of a considerable number of plants and plant communities. Data for the latter are obtained from a variety of sources, and more particularly from SHREVE'S well known map of the vegetation areas of the United States. In fact a generalized form of this map is employed as a basis upon which to display the distribution of climatic factors. In addition to this, ranges of various plant species and groups of species, such as deciduous, microphyllous, and broad-leaved evergreen trees, are delimited. Here emphasis is placed upon the lack of anything like an adequate knowledge of the ecological distribution, based on relative abundance, dominance, or density of stand, of any considerable number of plants even in such a well explored land as our own.

A general discussion of the influence of the environment on plant life classifies environmental factors which are important in distribution as: (1) moisture conditions, (2) temperature conditions, (3) light conditions, (4) chemical conditions, (5) mechanical conditions. These are considered in turn. In discussing the supply of water to vegetation the "residual soil moisture content" of the soil is not regarded as a soil constant, in spite of many data tending to prove that within very considerable limits its constancy holds. No mention is made of wilting or hygroscopic coefficients, nor of the notable contributions of such well known investigators as ALWAY, SHULL, KEEN, and BOUYOUCOS. These omissions constitute the most serious defect in an otherwise admirable and comprehensive volume.

The tabulation of the climatological data, used for the construction of the maps, in a form that makes them available for future investigators is highly to be commended. As an example of such accumulations of exact information regarding conditions limiting growth and distribution, the table of frost data may be cited. Here for 1803 different stations the altitude, number of years of record, average date of the last frost in spring, and the earliest in the

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[9] LIVINGSTON, B. E., and SHREVE, F., The distribution of vegetation in the United States as related to climatic conditions. Carn. Inst. Wash. Publ. 284; pp. xvi+590. *pls. 73. figs. 74.* 1921.